July 17, 1934. H. R. STANDLEE 1,966,906

TUBING SPIDER

Filed Nov. 15, 1933 4 Sheets-Sheet 1

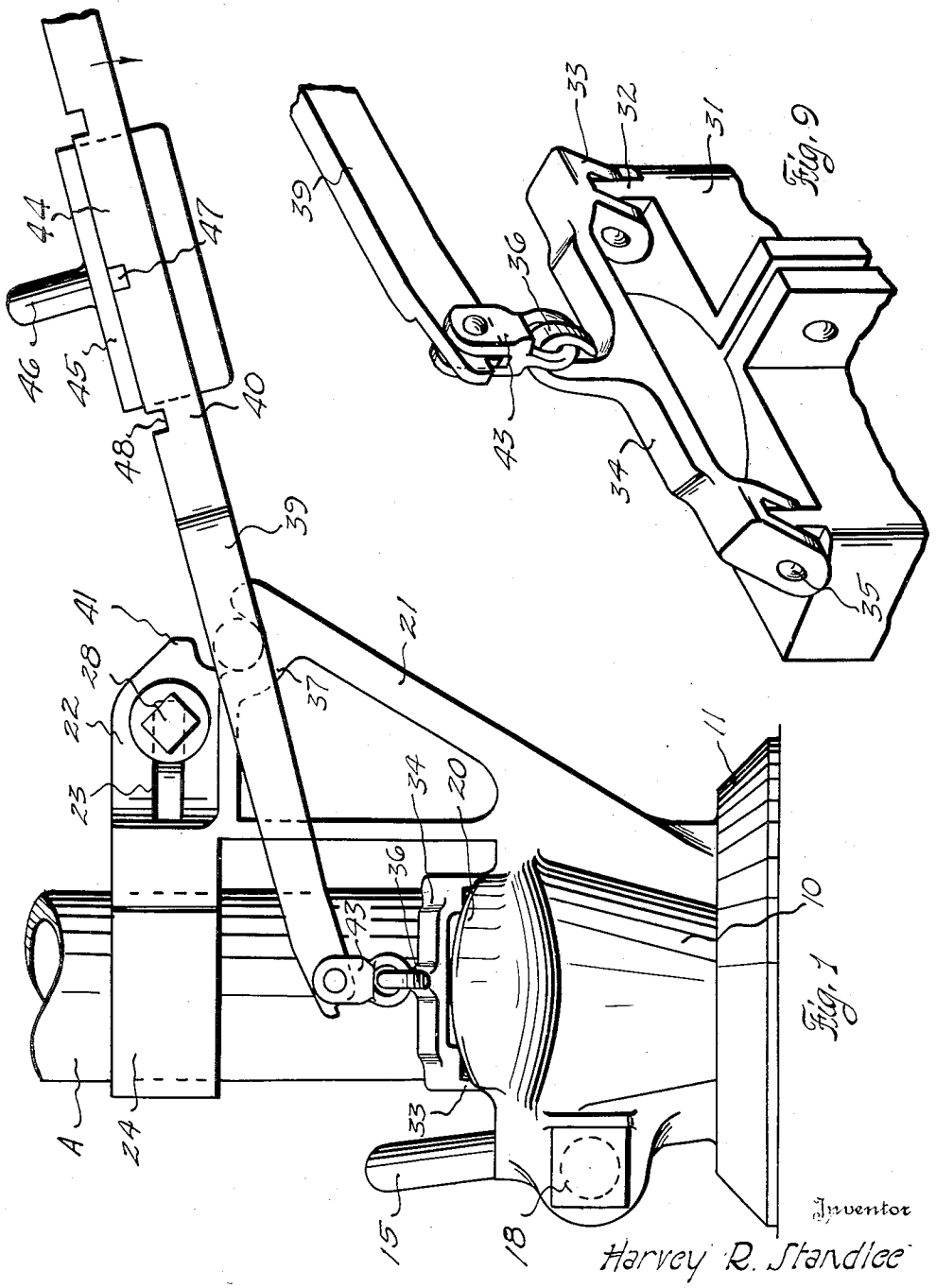


Fig. 9

Fig. 1

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TUBING SPIDER

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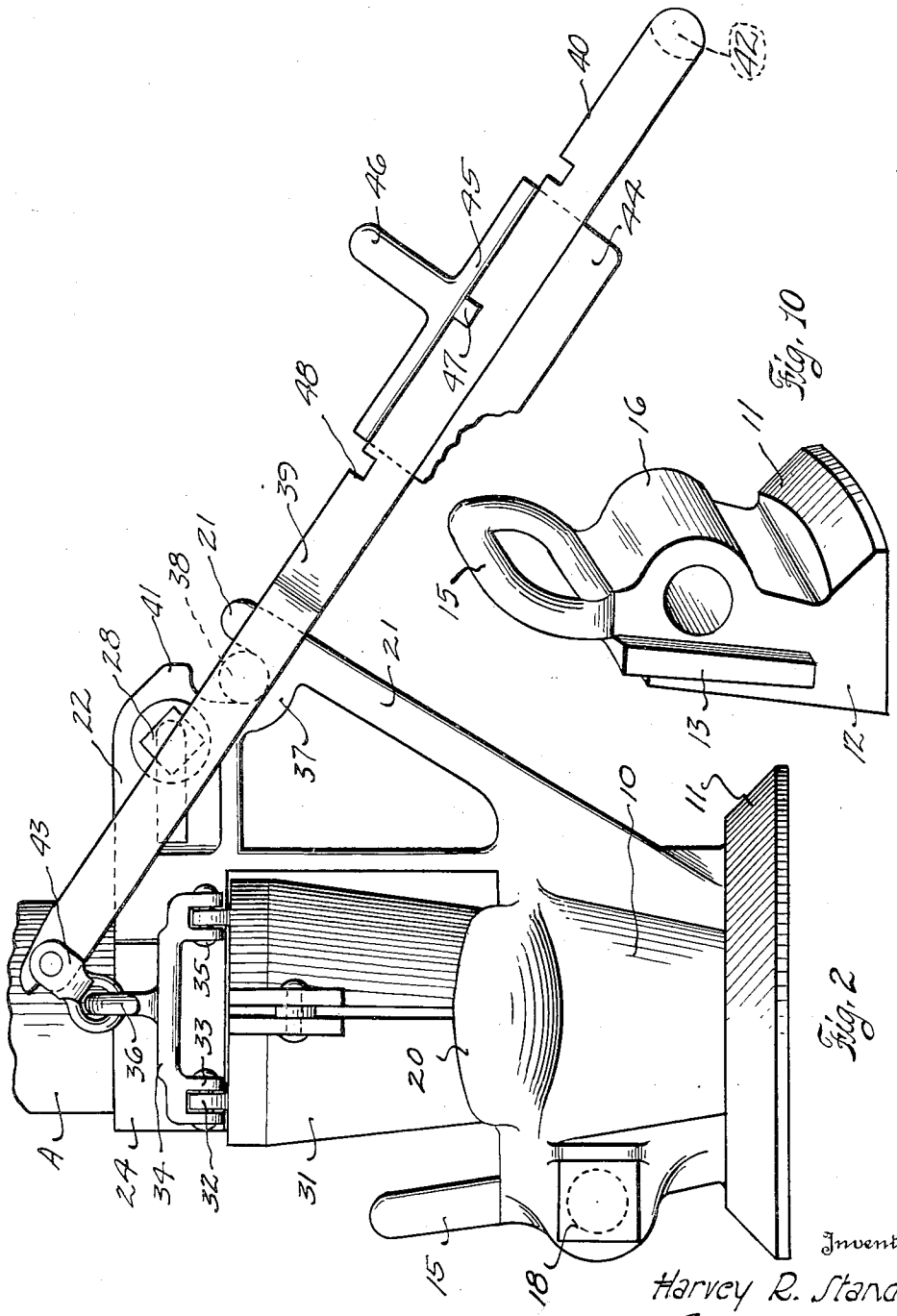


Fig. 10

Fig. 2

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TUBING SPIDER

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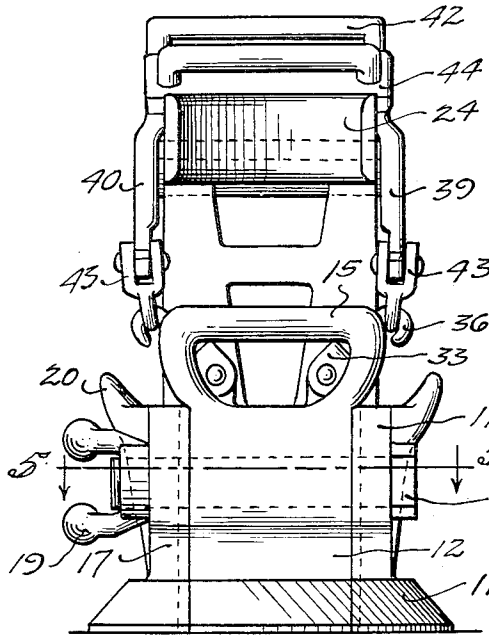


Fig. 3

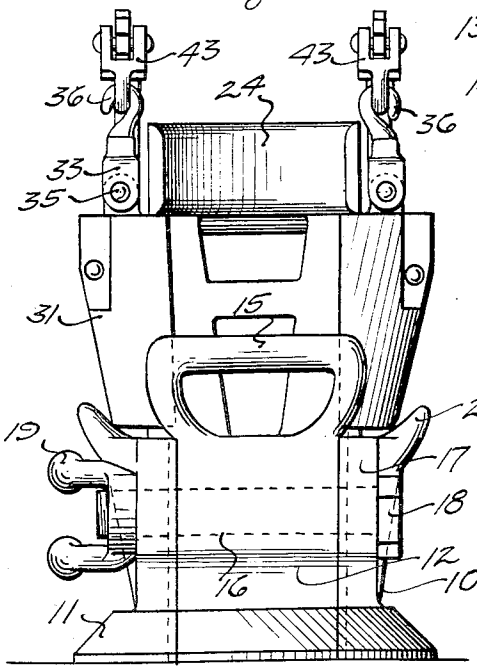


Fig. 4

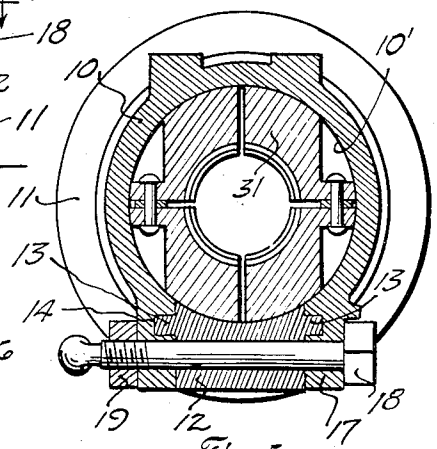


Fig. 5

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TUBING SPIDER

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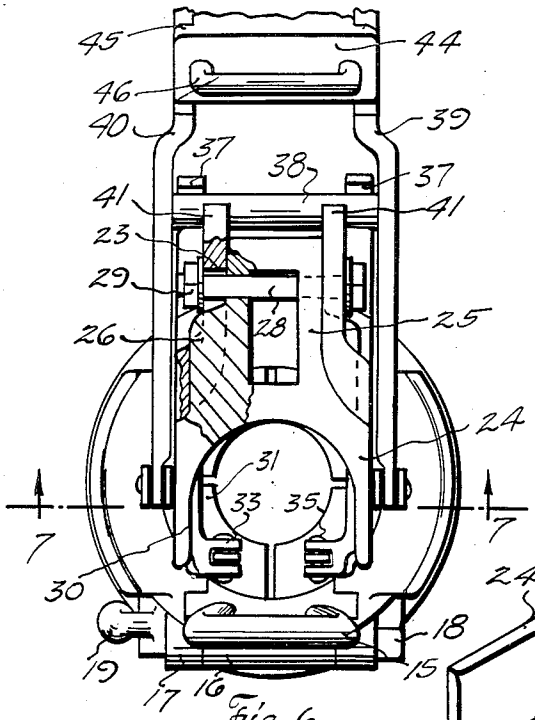


Fig. 6

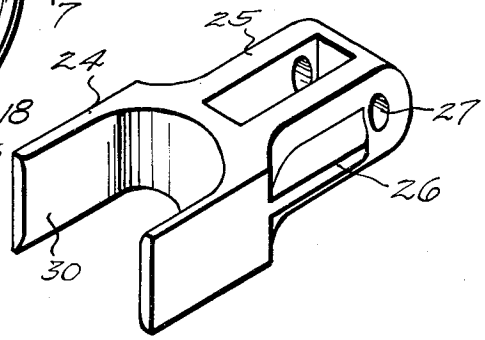


Fig. 8

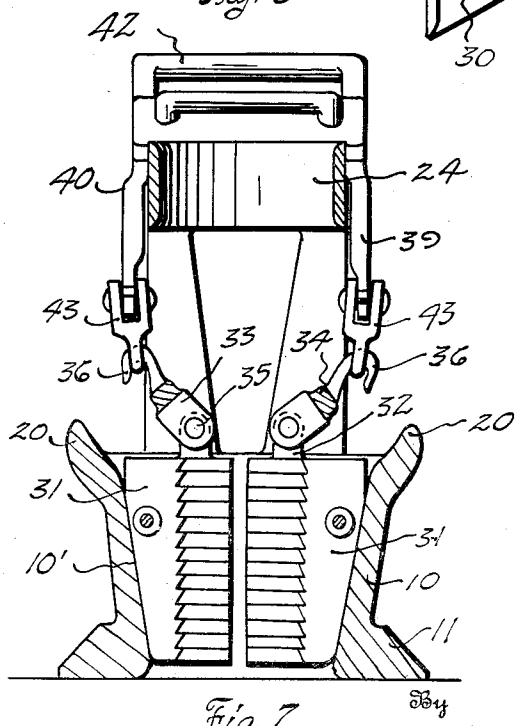


Fig. 7

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Patented July 17, 1934 1,966,906

UNITED STATES PATENT OFFICE

1,966,906

TUBING SPIDER

Harvey R. Standlee, Tulsa, Okla., assignor to The Guiberson Corporation, Dallas, Tex., a corporation of Delaware

Application November 15, 1933, Serial No. 698,122

14 Claims. (Cl. 24—263)

This invention relates to new and useful improvements in well spiders.

One object of the invention is to provide an improved well spider through which well tubing and casing may be efficiently and safely, as well as economically run.

When running tubing or casing into a well it is very important and advantageous that the string of tubing or casing hang in the center, axially of the spider, so that the gripping slips may slide freely and loosely up and down the string within the body of the spider. This assures uniform gripping and proper alining of the string of tubing or casing.

An important object of the invention is to provide a spider with an adjustable guide or support over-hanging the bowl and arranged to center the tubing string axially in the bowl of the spider. As very few wells are straight the tubing or casing will drag on one side, when being raised or lowered, thus by placing the spider with its guide on this side of the well, thereby moving the tubing or casing to the center and holding it there.

Another object of the invention is to provide a positive stop for preventing swinging of the slips from the spider bowl when they are raised from their gripping position, so that it is not necessary for the operator to manually replace said slips. The guide may serve as this stop, thus having a dual function.

A further object of the invention is to provide an operating lever for raising and lowering the slips and equipped with a counter-balancing weight adjustable thereon. This weight may be set so as to counter-balance the slips, thus making the swing of the same easy, whereby the tubing will start the slips upwardly, when it is lifted, and the weight will continue the swing of the lever and the raising of the slips. Where it is desirable to have the slips remain in the bowl, so as to quickly grip the tubing in case it falls, said weight may be so adjusted.

Still another object of the invention is to provide an improved slip suspension which will reduce the number of parts, simplify the construction and afford a quick and easy disengaging of each pair of slips from the lever.

A further object of the invention is to provide a spider in which the parts are ruggedly constructed and conveniently arranged and so related to each other as to most efficiently co-operate; and also one in which a minimum amount of machine work is required, thus making for expensive manufacture.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings in which an example of the invention is shown, and wherein:

Figure 1 is a side elevation of a spider constructed in accordance with the invention and showing the slips lowered into the bowl to engage a string of tubing.

Figure 2 is a similar view showing the slips raised and released from the tubing.

Figure 3 is a front elevation with the parts in the position shown in Figure 1,

Figure 4 is a front elevation with the parts as shown in Figure 2,

Figure 5 is a horizontal cross-sectional view taken on the line 5—5 of Figure 3,

Figure 6 is a view partly in plan and partly in section,

Figure 7 is a transverse vertical sectional view taken on the line 7—7 of Figure 6,

Figure 8 is a perspective view of the guide yoke,

Figure 9 is a detail of the slip suspension, and

Figure 10 is a perspective view of the bowl gate.

In the drawings the numeral 10 designates the bowl of the spider which is provided with a beveled annular base flange 11 adapted to be fastened in a casing head or adapter (not shown). The bowl is provided in its front side with a gate 12. The gate has vertical guides 13 (Figures 5, 6 and 10) on each side slidable in channels 14, whereby the gate may be slid upwardly, but is held against outward displacement when closed. A looped handle 15 is formed on top of the gate for use in sliding it from the bowl.

When the gate is opened or removed a gap is left which is wide enough to receive the tubing or casing for which the spider is adapted. This permits the spider to be placed around a string of tubing or casing, simply by removing the gate; and obviates the necessity of making the bowl in diametrically split sections. The gate has a transverse cored boss 16 on its outer side located between ears 17 on the bowl. A heavy bolt 18 passes through the ears 17 and boss receives a wing nut 19, whereby the parts are drawn together.

The bowl including the gate has an upwardly inclined or flared bore 10' as is best shown in Figure 7. On opposite sides outwardly curved lips 20 are formed on the upper edges of the bowl. Upright brackets 21 are cast integral with the

rear side of the bowl and extend upwardly therefrom. These brackets are in the form of inverted triangles. Each bracket has a vertical flange 22 cast in its upper end which extends forwardly and overhangs the bowl. The flanges are provided with longitudinal slots 23.

A guide yoke 24 is formed with a reduced shank 25 (Figure 8) sliding between the flanges 22 (Figure 6). The forward ends of the flanges are curved outwardly so that the slots 23 may have their front ends open to receive supporting wings 26 on the sides of the shank, whereby the shank is slidably supported between the flanges. The curved ends of the flanges also act as stops to limit the rearward movement of the yoke. The yoke has a transverse bolt hole 27 receiving a bolt 28 passing through the slots and fastened by a nut 29.

The yoke 24 has a deep crotch 30 the upper and lower edges of which are rounded so as not to mar the tubing or casing. The term "tubing" as used hereinafter is intended to cover casing or any tubular or cylindrical member which might be used in the spider. The yoke overhangs the bowl and the crotch is preferably U-shaped and made deep enough to receive more than half the diameter of the tubing. The yoke is adjusted to engage the tubing A (Figures 1 and 2) and center it axially in the bowl. The string of tubing will be run up and down through the yoke and the crotch is wide enough to permit the coupling collars to pass therethrough. The rounded edges will prevent catching of the collars. The yoke may be inverted if desired.

In order to support the tubing in the bowl some kind of slips are required, but the invention is not to be limited to the particular kind of slips or to the means for operating the same, because the slips could be removed and replaced by hand, but such a method is dangerous and I prefer to use mechanical means for raising and lowering the slips.

I prefer to use toothed slips 31 which are arranged in pairs disposed on opposite sides of the bore 10' of the bowl. The slips illustrated are similar to those shown in my Letters Patent No. 1,864,953 issued June 28, 1932, and fully described therein. The slips of each pair are provided with eyes 32 engaging between ears 33 on the ends of a spreader yoke or hanger 34 and loosely hung on pins 35 (Figures 2 and 9) fastened in said ears. The spreader yokes are disposed substantially parallel of the flanges 22 and each has an outwardly bent hook 36 at its center, whereby it and its slips may be suspended.

At the rear ends of the flanges 22 the brackets 21 are formed with fulcrum sockets 37 for receiving a transverse fulcrum bar 38. The bar is cylindrical and is cast integral at its ends with the side bars 39 of a U-shaped lever 40. The fulcrum bar 38 may be lifted from the sockets, but guard fingers 41 in the rear ends of the flanges 22, overhang said bar and prevent unintentional dislodgment thereof from said sockets. The rear end of the lever 40 (Figures 2, 3 and 7) has a cylindrical handle 42 integral with its side bars.

The lever bars 39 forwardly of the fulcrum, straddle the brackets 21 so as to swing in vertical arcs outside of the flanges 22 and the yoke 24. The forward end of each lever is reduced and has loosely pivoted thereto a clevis 43 receiving one of the hooks 36, whereby the slips 31 are suspended by the lever 40. When the lever is swung to the position shown in Figures 1 and 3 the slips are slid down the inclined bore 10' of the bowl into gripping engagement with the tubing A. Upon swinging the lever downwardly the slips are elevated to the position shown in Figures 2 and 4.

When the slips are swung upwardly they strike the undersides of the yoke 24 and the overhanging ends of the flanges 22 as is shown in Figure 2, whereby a positive stop is provided. The lips 20 prevent the lower ends of the slips from swinging out of the bowl and this is a very important feature. As the slips move upwardly in the flared bore 10', they are spread apart, thus releasing the tubing. By observing Figure 7 it will be seen that the lips 20 are dished and the lower outer edges of the slips are rounded.

With the slips in their uppermost position the lower ends of the same will be in engagement with the dished surfaces of said lips. This will permit the slips to nearly swing out of the bore 10', thus giving ample clearance for passage of collars and the like. The dished surfaces of the slips are sufficiently inclined to displace the lower ends of said slips into the bore of the bowl when the slips are lowered.

A very useful feature of the invention is a counter-balancing weight 44 slidably disposed between the side bars 39 of the lever and having laterally directed side flanges or shoes 45 engaging on the top edges of said bars. The weight is formed with a loop handle 46 and lugs 47 on the under sides of the shoes engage in notches 48 in the side bars, whereby the weight is held against sliding when the lever is swung. By lifting the weight sufficiently to withdraw the lugs from their notches, said weight may be moved along the lever and thus adjusted. This weight counter-balances the slips and has numerous advantages as will be hereinafter pointed out.

In using the spider the gate 12 is removed so that the bowl 10 may be moved forwardly, whereby the tubing is passed through the gap left by the gate and received in the bore 10'. The bowl may then be lowered onto the casing head or other support (not shown). The bowl is rotated so that the string of tubing A, if not hanging in the center of the bore, will contact with the rear side of said bore which is opposite the bracket 21. The string of tubing will also be received in the crotch 30 of the yoke 24.

By loosening the nut 29 to free the bolt 28 the yoke 24 may be slid forwardly, whereby the tubing A will be shifted to the center of the bore of the bowl so as to hang axially of said bore. By positioning the spider as above described the tubing will bear against the guide and thus be held in a central position substantially concentric to the bore of the bowl. When the guide has been adjusted it may be fastened and the gate 12 may be replaced, if this has not already been done. When the spider is placed in position the slips 31 may be elevated as is shown in Figures 2 and 4, and the weight 45 will have been adjusted on the lever 40 to hold said slips in their elevated position.

After the spider has been placed in position and the adjustments made it is ready for operation. The tubing A is raised or lowered, as the case may be, to the point where it is desired to suspend the same by the spider. To accomplish the gripping of the tubing the workman merely has to grasp the handle 42 and swing the lever 40 from the position shown in Figure 2 to the position shown in Figure 1. The slips dropping into the downwardly inclined bore 10' will engage around the tubing and when the lever is released from its

suspension, the teeth of the slips will immediately grip the tubing in the usual way. Because of the centering of the tubing by the guide 24 the slips will be induced to more uniformly grip said tubing. It is obvious that if the tubing were permitted to bear against one side of the bore, the slips on this side would grip the tubing before those on the other side, thus taking only a partial hold on the tubing. The simplicity of setting the slips and the uniform gripping of the same is an important feature.

In operating the slips the workman may stand at the end of the lever, whereby he is at least two feet from the tubing and is not required to bend over the bowl or to place the fingers near the slips. He is thus protected from injury and is not likely to inhale the gas fumes rising from the well, nor are his eyes subjected to the poisonous gases which rise from the wells in some fields. The safety features, the sure gripping and guide of the tubing are pointed out as advantages of the invention.

The weight 45 may be adjusted so as just to counterbalance the slips 31 and thus when the tubing is elevated the slips will be lifted thereby, owing to the gripping contact. The tubing will lift the slips sufficiently to cause them to swing the lever 40, whereby the weight will over-balance said slips and continue to swing the lever until the parts reach the position shown in Figure 2. The slips striking the guide and the flanges will be arrested and their further movement prevented. In some cases where the well is flowing there is danger of dropping the tubing when a considerable portion thereof has been removed. In such instances the operator prefers to allow the slips to remain in the bowl when the tubing is elevated, whereby they are in position to instantly grip the tubing in case it should fall. To accomplish this it is merely necessary to move the weight 45 forwardly toward the fulcrum bar 38. When this adjustment is made the slips will drop back into the bowl when the tubing is elevated because said slips will quickly free themselves from the tubing and the weight of said slips will be sufficient to hold the lever in its down position.

It is pointed out that the guide 24 may be removed and one with a larger or smaller crotch substituted therefor when it is desired to handle a tubing of different diameter. The hooks 36 may be quickly disengaged from the clevises 43 and other sizes of slips connected in place thereof. In the manufacture of the spider all parts may be cast and it is only necessary to machine the bore 10' and the slips. This makes for economical manufacture.

The description which has been given, recites more or less detail of a particular embodiment of the invention, which is set forth as new and useful, however, I desire it understood that the invention is not limited to such exact details of construction, because it is manifest that changes and modifications may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. A well spider comprising, a bowl, means overhanging the bowl for centering a tubular string in said bowl, gripping slips engaging in said bowl, and means for moving said slips upwardly and downward in said bowl and below said centering means.

2. A well spider comprising, a bowl, means overhanging the bowl for centering a tubular string in said bowl, gripping slips engaging in said bowl, means for moving said slips upwardly and downward in said bowl and below said centering means, and adjustable counter-balancing means for the slips for controlling their position when the string is lifted.

3. A well spider comprising, a bowl, a guide overhanging the bowl for centering a tubular string axially in said bowl, gripping slips co-acting with the bowl to grip a tubular string, and means for moving said slips upwardly and downwardly in said bowl below said guide.

4. A well spider comprising, a bowl, a guide overhanging the bowl for centering a tubular string axially in said bowl, gripping slips co-acting with the bowl to grip a tubular string, means for moving said slips upwardly and downwardly in said bowl below said guide, and a stop for limiting the upward movement of said slips to retain their lower ends within the bowl.

5. A well spider comprising, a bowl, a guide overhanging the bowl for centering a tubular string axially in said bowl, gripping slips co-acting with the bowl to grip a tubular string, means for moving said slips upwardly and downwardly in said bowl below said guide, and a counter-balancing weight carried by said slip-moving means.

6. A slip suspension for a spider comprising, a spreader yoke having hinge members at its ends for suspending a pair of slips, a hook on said yoke intermediate its ends, and a clevis engaged in said hook for suspending said yoke.

7. A well spider comprising, a bowl, slips in the bowl, a fulcrum having spaced journals, a U-shaped lever having pivoted connections with slips at one end and a cross handle at its opposite end, a cross bar intermediate the ends of the lever engaging in the journals of the fulcrum, a weight slidable in the lever between the fulcrum and the handle, and means for holding the weight in adjusted positions on the lever.

8. A well spider comprising, a bowl having a gate for placing it about a tubular string suspended in a well, an upright support mounted on the bowl, a guide carried by the support and overhanging the bowl for engaging a tubing string and centering it axially in said bowl, and slips for engaging a tubular string in said bowl.

9. A well spider comprising, a bowl having a gate for placing it about a tubular string suspended in a well, an upright support mounted on a bowl, a guide carried by the support and overhanging the bowl for engaging a tubing string and centering it axially in said bowl, slips for engaging a tubular string in said bowl, and means for raising and lowering said slips.

10. A well spider comprising, a bowl, gripping slips for engaging a string of tubing extending through the bowl, and means overhanging the bowl for displacing a string of tubing dragging on the side of said bowl to the axial center of the bowl, whereby the slips may evenly engage the tubing string.

11. A well spider comprising, a bowl, gripping slips co-acting with the bowl to grip a string of tubing therein, and a guide overhanging the bowl at one side for displacing a string of tubing from said side to the axial center of said bowl, whereby the string of tubing is prevented from dragging on the side of the bowl.

12. A well spider comprising, a bowl, a gate for the bowl, an upright support carried by the bowl opposite said gate, a guide yoke overhang-

ing said bowl and adjustably mounted on the support for centering a tubular string in said bowl, a lever pivotally mounted on the support, and slips suspended from the lever in the bowl.

13. A well spider comprising, a bowl, a gate for the bowl, an upright support carried by the bowl opposite said gate, a guide yoke overhanging said bowl and adjustably mounted on the support for centering a tubular string in said bowl, a lever pivotally mounted on the support, and slips suspended from the lever in the bowl, the support projecting into the path of the slips to limit their upward movement.

14. A well spider comprising, a bowl, a gate for the bowl, an upright support carried by the bowl opposite said gate, a guide yoke overhanging said bowl and adjustably mounted on the support for centering a tubular string in said bowl, a lever pivotally mounted on the support, slips suspended from the lever in the bowl, and a weight mounted on the lever having a handle for moving it along said lever.

HARVEY R. STANDLEE.